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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,968	12/02/2003	Andrew J. Onderkirk	59418US002	4393
32692	7590	04/24/2007	EXAMINER	
3M INNOVATIVE PROPERTIES COMPANY PO BOX 33427 ST. PAUL, MN 55133-3427			ARTMAN, THOMAS R	
			ART UNIT	PAPER NUMBER
			2882	
SHORTENED STATUTORY PERIOD OF RESPONSE		NOTIFICATION DATE	DELIVERY MODE	
3 MONTHS		04/24/2007	ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/24/2007.

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<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/726,968	OUDERKIRK ET AL.
	Examiner Thomas R. Artman	Art Unit 2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on January 30th, 2007.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1,3-7 and 9-15 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1,3-7 and 9-15 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 02 December 2003 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date 9/8/06; 10/5/06.

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Terminal Disclaimer***

The terminal disclaimers filed on January 30<sup>th</sup>, 2007, disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on application 10/726995 and on application 10/726790 has been reviewed and is accepted. The terminal disclaimer has been recorded.

### ***Information Disclosure Statement***

The information disclosure statements (IDS) submitted on September 8<sup>th</sup>, 2006, and October 5<sup>th</sup>, 2006, are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner. Please see the attached PTO-1449s with the examiner's initials, signature and date considered.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5, 6, 9 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller (US 6,155,699) in view of Schrenk (US 5,540,978).

Regarding claims 1, 15 and 16, Miller discloses a light source and method of manufacture, (Figs.2-3), including:

- a) (providing) an LED 12 that emits excitation light,
- b) (positioning) a layer of phosphor material 36 positioned to receive excitation light, the phosphor material emitting visible light when illuminated with the excitation light ("primary light," col.3, lines 61-63), and
- c) (positioning and shaping) a non-planar, multilayer reflector 30 being positioned between the phosphor material and the LED, where the reflector transmits the excitation light and reflects visible light ("secondary light," col.3, line 47 through col.4, line 9).

Miller does not specifically disclose that the reflector is flexible or that it is made of a polymeric material that resists degradation when exposed to blue, violet or ultraviolet light.

Schrenk specifically teaches a flexible, all organic (polymeric) multilayer reflector, where the polymer materials are suitable for visible as well as UV operation, since the polymeric materials do not absorb UV or visible light, thus resisting degradation that may be caused by blue, violet or UV light (see Abstract, as well as col.2, lines 62-66; col.5, lines 28++). The use of polymers provides better thermal expansion property matching with Miller's epoxies resins (28 and 22) such that flaws due to thermal fatigue are minimized for improved longevity.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Miller to use polymeric materials suitable for multilayer reflectors in visible and UV applications, as taught by Schrenk, in order to improve the cost efficiency, weight and longevity of the light source, as taught by Schrenk and as is known in the art.

With respect to claims 5 and 6, the Miller/Schrenk combination results in the polymeric multilayer reflector having a hemispherical concave shape.

With respect to claim 7, Miller further discloses that the phosphor material is disposed on the multilayer reflector (Figs.2-3).

With respect to claim 9, Schrenk further teaches that the layers are substantially free of inorganic materials (col.3, line 51 through col.4, line 3).

With respect to claim 17, Schrenk further teaches thermoplastic polymers, including polymethylpentene (col.3, lines 64-67). Therefore, during manufacture, the materials are thermoformed.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller and Schrenk, as applied to claim 1 above, in view of Weber et al. ("Giant Birefringent Optics in Multilayer Polymer Mirrors"; hereinafter Weber).

Schrenk teaches thermoplastic polymers (incl. polymethylpentene, col.3, lines 64-67).

Neither Miller nor Schrenk teach that at least some of the layers are birefringent.

Weber teaches the known advantages of making at least some of the layers in a multilayer stack birefringent, providing improved reflectivity properties in order to decrease the amount of light that is reflected back to the source, thus improving light output efficiency.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for at least some of the layers of the polymeric multilayer reflector of the Miller/Schrenk combination to be birefringent in order to improve the efficiency of the device, as suggested by Weber.

Claims 4 and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller and Schrenk, as applied to claim 1 above, in view of Levinson (US 6,653,765).

With respect to claim 4, Miller does not disclose the use of a UV excitation light. The excitation light of Miller is blue.

Levinson teaches the use of LEDs that produce excitation light of UV and/or blue light in the GaN family of LEDs, where the UV emittance is used solely to stimulate the phosphor, and the blue light is also used to stimulate the phosphor. The bands are often emitted simultaneously by the same device (UV/blue LED).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Miller to use UV excitation light as suggested by Levinson and as is known in the art, since UV and blue wavelengths are functional equivalents, and further providing the advantage of being able to use more types of phosphors that are stimulatable by UV wavelengths much more efficiently than by blue wavelengths.

With respect to claims 10 and 11, Miller does not disclose that the phosphor material is discontinuous, or more specifically, being made of a plurality of dots.

Levinson specifically teaches the use of a discontinuous, powdered (dots) phosphor material (col.8, lines 40-42). In this way, light conversion is more efficient than a phosphor in bulk form (see Abstract, as well as col.2, lines 27-32).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Miller to use a discontinuous phosphor as a plurality of dots as taught by Levinson for the purpose of improving light generation efficiency.

With respect to claim 12, Levinson does not specifically teach the size of the phosphor dots, specifically having areas less than 10,000 square microns. Levinson does teach, however, that the size of each dot needs to be sufficient for most of the UV/blue light to be converted to yellow light (col.8, lines 46-48).

Therefore, it is within routine experimentation of the skilled artisan to determine the optimum area of the dots of phosphor for the excitation light to be converted to secondary light.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the Miller/Levinson combination to have dots having areas smaller than 10,000 square microns, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to make the dots with areas smaller than 10,000 square microns for the purpose of improving light conversion efficiency In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With respect to claims 13 and 14, Levinson further teaches that the phosphor dots emit light red, green and blue light when illuminated with excitation light, and further that multiple types of phosphors may be mixed together (col.7, line 64 through col.8, line 24 and lines 41-48).

*Response to Arguments*

Applicant's arguments filed January 30<sup>th</sup>, 2007, have been fully considered but they are not persuasive. Applicants argue that the combination of Miller and Shrenk is impermissible at least because the polymers of Shrenk would not provide appropriate thermal expansion matching to the glass components of Miller, as asserted by the Office action. The examiner respectfully disagrees.

Miller cites that the encapsulant 28 and lens 22 can be made of epoxy or glass. The combination does not have to be obvious for every possible embodiment of either or both prior art references. Therefore, there are embodiments in the disclosure of Miller that, when combined with the polymeric multilayer reflectors of Shrenk, would provide improved thermal coefficient matching with the epoxies of Miller. As is known in the art, Miller's ceramic mirror of titanium oxides and silicon oxides provide good thermal expansion coefficient matching with glass. As is also known in the art, Miller's embodiments that use epoxy would obviously benefit from a polymeric mirror in order to improve the longevity of the device and manufacturing reliability by matching the thermal expansion properties of all materials involved as much as possible.

Therefore, Applicants' arguments are not persuasive, and the rejections have been maintained above.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485. The examiner can normally be reached on 9am - 5:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thomas R. Artman  
Patent Examiner



EDWARD J. GLICK  
SUPERVISORY PATENT EXAMINER